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EXAMINER	
FLEISCHER, MARK A	

ART UNIT	PAPER NUMBER
3624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/707,979	DENTON ET AL.	
	Examiner	Art Unit	
	MARK A. FLEISCHER	3624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 May 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *27 July 2009 and 8 April 2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. This action is in reply to the amendments filed on 15 May 2009.
2. Claims 1-4, 7-8, 10, 14-16, 20-21, 23 and 27 have been amended.
3. Claims 1 – 27 are currently pending and have been examined.

Information Disclosure Statement

4. The Information Disclosure Statements filed on 8 April 2009 and 27 July 2009 have been considered. Initialed copies of the Form 1449 are enclosed herewith.

Response to Amendments

5. The objections to claims 8, 14, 15, 20, 21 and 27 are withdrawn in light of Applicant's amendments. The Examiner notes that claim 1 was erroneously objected to in the previous Office action and apologizes for any inconveniences. Thus, no objection is outstanding with regards to claim 1.
6. The rejection of claims 1, and 4 under 35 U.S.C. §112, second paragraph are withdrawn in light of Applicant's amendment and arguments. Note however that Examiner has changed the rejection of claim 1 under this statute to an objection.
7. The rejection of claims 3, 10, 16 and 23 under 35 U.S.C. §112, second paragraph are maintained for reasons set forth below.
8. The rejection of claims 1 – 27 under 35 U.S.C. §101 are maintained for reasons set forth and further amplified below.

Response to Arguments

9. Applicant's arguments received on 15 May 2009 have been fully considered but they are not persuasive. Referring to the previous Office action, Examiner has cited relevant portions of the references as a means to illustrate the systems as taught by the prior art. As a means of providing further clarification as to what is taught by the references used in the first Office action, Examiner has expanded the teachings for comprehensibility while maintaining the same grounds of rejection of the claims, except as noted above in the section labeled “Status of Claims.” This information is intended to assist in illuminating the teachings of the references while providing evidence that establishes further support for the rejections of the claims.

10. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection. Nevertheless, for purposes of advancing prosecution, Examiner has amplified on the selected portions of the prior art.

11. With regard to the limitations of claims 1, 2, 5, 6, 8, 9, 15, 21 and 22, Applicant essentially argues that the purposes and intended use of the methods of the instant application are distinct from those of the cited prior art. Applicant argues, and points out that the cited prior art is geared towards Material Requirements Planning and that its methods while they use a sequence of scheduled releases obtained through its solution methods, while the methods of the Applicant’s invention is geared towards allocation of resources among a set of demand priorities. Applicant’s arguments, specifically on page 12 of their Remarks is a bit confusing in the text where they refer to Hegde and text therein. What is clear is that they argue that Hegde does not teach aspects of sets of demand priorities. Examiner notes however that these teachings are made by Fakhouri specifically with respect to resource allocation. The methods of Hegde and de Farias coupled with the teachings of hierarchical resource allocation solutions of Fakhouri via linear and integer programming methods render the claims of the Applicant as an obvious variation of what is known in the art.

12. The further arguments with respect to the alleged shortcomings of de Farias are moot in light of the additional passages cited from Fakhouri. Applicant is advised that Examiner has pointed out

particular references contained in the prior art of record within the body of this action for the convenience of the Applicant. Although the specified citations are representative of the teachings in the art and are applied to the specific limitations within the individual claim, **other passages and figures may apply**. Applicant, in preparing the response, should consider fully the entire reference as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner. See also 37 CFR §1.104.

13. Examiner has amplified upon the specific teaching for purpose of guiding the Applicant in their prosecution and further requests clarification of their arguments, specifically as they are presented on page 12 of their Remarks.

14. Regarding the rejections of claims 3, 4,7, 10-14, 16-20 and 23-27 with the additional are of Leachman, Applicant argues that none of the prior art teaches or suggests "determining independently for each set of priorities". Applicant then states that assuming the Examiner's interpretation has some merit, the cited prior art nonetheless does not teach the steps of optimizing according to the sets of demand priorities. Examiner, however, has amplified the teachings especially with respect to Fakhouri in claim 3 to illustrate how the specific teachings are taught or render the claims as an obvious variation of Fakhouri.

15. Regarding claims 3, 4, 5, 6, 7, 9, 10, 14, 16, 20, 22, 23 and 27, Applicant has failed to rebut Examiner's **Official Notices** that

- (claim 3) it is old and well-known as well as common place in the management science arts to refer to backorder costs or other constraint violations as penalties that are included in the objective function of a mathematical program,
- (claim 4, 10, 16 and 23) it is old and well-known as well as common place in the management sciences that decision/allocation problems with multiple stages are often posed as dynamic programming problems wherein each stage provides the starting point or allocation for the next stage (Examiner notes that amended language refers to a "starting solution" which is an equivalent term in this context.).
- (claims 5) it is old and well-known as well as common place in the mathematical sciences

that mathematical programs, and in particular, dynamic programming problems are problems that are posed in a well-defined formulation wherein adding additional constraints in one stage maintains feasibility in the previous stage or within the problem definition without the additional constraint,

- (claims 6, 9 and 22) it is old and well-known as well as common place in the dynamic programming sciences to use a new formulation of a linear program by adding constraints based on prior allocations and such new constraints, *ipso facto,* result in a different mathematical linear program,
- (claims 14, 20 and 27) it is old and well-known as well as common place in the data processing arts to enable processes to be performed either separately or in parallel, *i.e.,* simultaneously.

16. Examiner notes the following discussion of Official Notice taken from the MPEP:

> To adequately traverse such a finding, an applicant must specifically point out the supposed errors in the examiner's action, which would include stating why the noticed fact is not considered to be common knowledge or well-known in the art. See 37 CFR 1.111(b). See also *Chevenard, 139 F.2d at 713, 60 USPQ at 241* ("[I]n the absence of any demand by appellant for the examiner to produce authority for his statement, we will not consider this contention."). A general allegation that the claims define a patentable invention without any reference to the examiner's assertion of official notice would be inadequate. If applicant adequately traverses the examiner's assertion of official notice, the examiner must provide documentary evidence in the next Office action if the rejection is to be maintained. See 37 CFR 1.104(c)(2). See also *Zurko, 258 F.3d at 1386, 59 USPQ2d at 1697* ("[T]he Board [or examiner] must point to some concrete evidence in the record in support of these findings" to satisfy the substantial evidence test). If the examiner is relying on personal knowledge to support the finding of what is known in the art, the examiner must provide an affidavit or declaration setting forth specific factual statements and explanation to support the finding. See 37 CFR 1.104(d)(2). If applicant does not traverse the examiner's assertion of official notice or applicant's traverse is not adequate, the examiner should clearly indicate in the next Office action that the common knowledge or well-known in the art statement is taken to be admitted prior art because applicant either failed to traverse the examiner's assertion of official notice or that the traverse was inadequate. If the traverse was inadequate, the examiner should include an explanation as to why it was inadequate. (MPEP § 2144.03(C))

17. Applicant has not "specifically point[ed] out the supposed errors in the examiner's action, which would include stating why the noticed fact is not considered to be common knowledge or well-known in the art." Applicant statements do not amount to a sufficient traversal because no such statements were offered. For these reasons, the above **Official Notices** are taken to be admitted prior art.

Claim Objections

18. Claim 1 is objected to because of the following informalities: **Claim 1** resites "allocating resources **to** different demand priorities by…" (emphasis added) is incomprehensible. Examiner notes that allocation decisions may be made based on priorities, but the allocation is to and among **groups receiving such allocations** and not to 'priorities'. The current phraseology makes the claim unclear and confusing as the claim does not clearly specify how the allocation decisions are made. In addition, the term "consistent with" in the claim is also rather vague. Examiner notes that the claim was amended, but the insertion of the term 'demand' preceding the term 'priorities' does not cure the basic defect as to the meaning of what is being allocated. Resources are allocated to entities that perhaps have priorities, but not to priorities themselves.. For purposes of examination, Examiner interprets the claim as allocations are based on sequentially computed solutions to groups with groups having higher priority levels first and that once a higher level allocation is made, the allocation to lower level ranking groups are made based on the current, remaining supply (*i.e.,* consistent with).

Claim Rejections - 35 USC § 112

19. The following is a quotation of the second paragraph of 35 U.S.C. §112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

20. Claims 3, 10, 16 and 23 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- **Claim 3,** as amended, recites "… allocates a full range of backorder costs….", wherein the terms "full range" is unclear and vague. Does this mean that backorder costs have a lower bound and an upper bound? If so, what are they? Neither the specification nor the claim provide clarification as to what the terms mean and one of ordinary skill in the art would not be apprised of the scope of the invention. For purposes of further clarification, term "full" in is akin to a relative term which renders the claim indefinite. The absence of the bounds that comprise a range also renders the claim indefinite as the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. In this regard, the claim also appears to lack essential steps pertaining to the range, its definition and meaning. Applicant should ensure that any such steps or modifications find support in the specification. Applicant should also ensure that any similar, problematic language not specifically cited here is addressed appropriately.
- **Claims 10, 16 and 23,** as amended, recite that a "model uses a program solution" of the previous…" wherein results can mean the values of the decision variables used as constraints, or the values of the optimal solution of the previous stage. The term 'solution' is vague and indefinite. Solutions or results to a linear program encompass the optimal objective function value and/or the optimal values of the decision variables (independent variables) and appears to be at issue. Does the linear programming formulation use the 'solution' as a constraint? How is this 'use' accomplished and what specifically is being used? It appears that a prior allocation of resources per the solution of a linear program results in less available resources, such availability being determinable given the solution of the previous linear program, and this is the manner in which the Examiner interprets the claims.

Claim Rejections - 35 USC § 101

21. 35 U.S.C. §101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

22. Claims 1-27 rejected under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter. Based on Supreme Court precedent, and recent Federal Circuit decisions, the Office's guidance to examiners is that a §101 process must (1) be tied to another statutory class (such as a particular apparatus) or (2) transform underlying subject matter (such as an article or materials) to a different state or thing. *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780,787-88 (1876). A method/process claim that fails to meet one of the above requirements is not in compliance with the statutory requirements of 35 U.S.C. 101 for patent eligible subject matter. Claims 1 – 27 fail to meet the above requirements because they are not tied to another statutory class of invention (such as a particular apparatus) nor do they transform underlying subject matter. **Nominal recitations** of structure in an otherwise ineligible method fail to make the method a statutory process. See *Benson*, 409 U.S. at 71-72. As *Comiskey* recognized, "the mere use of the machine to collect data necessary for application of the mental process may not make the claim patentable subject matter." *Comiskey*, 499 F.3d at 1380 (citing In re Grams, 888 F.2d 835, 839-40 (Fed. Cir.1989)). Incidental physical limitations, such as **data gathering**, field of use limitations, and **post-solution activity** are not enough to convert an abstract idea into a statutory process. In other words, nominal or token recitations of structure in a method claim do not convert an otherwise ineligible claim into an eligible one. Thus, the phrase “computer-implemented” or the limitations of “outputting …” are token or nominal recitations of structure. Further, it is noted that the fact that the method is computer implemented has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites

the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

23. An example of a method claim that would not qualify as a statutory process would be a claim that recited purely mental steps. Thus, to qualify as a §101 statutory process, the claim should positively recite the other statutory class (the thing or product) to which it is tied, for example by identifying the apparatus that accomplishes the method steps, or positively recite the subject matter that is being transformed, for example by identifying the material that is being changed to a different state. Examiner notes that while some of these claims (claims 21-27) do recite some components of the elements of another statutory class, they are insufficient to substantively tie them to another statutory class in that no correspondence is discernable between the various method steps and the particular components of the computer system.

Claim Rejections - 35 USC § 103

24. The following is a quotation of 35 U.S.C. §103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

25. Claims 1, 2, 5, 6, 8, 9, 15, 21 and 22 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hegde, et al. (US 7197469 B2) in view of de Farias (*The Linear Programming Approach To Approximate Dynamic Programming: Theory And Application*) and further in view of Fakhouri, et al. (US 746147 B1).

Claims 1, 8, 15 and 21:

Although claims 1, 8, 15 and 21 are worded and/or structured slightly differently, they have the same scope and so are addressed together. Hegde teaches the following limitations as shown.

- *allocating, by a computing device, resources* (Hegde [abstract] teaches "allocating resources including component supply…") *to different demand priorities* (Hegde [4,31] states "allocating resources sequentially at each level based on a priority ranking…" (emphasis added)) *by iteratively solving mathematical linear programs* (Hegde [12,19] refers to iteration and Hegde [4,31] teaches using "linear programming"), *wherein each mathematical linear program optimizes according to one of a plurality of sets of priorities wherein each set contains a plurality of priorities, and each iterative solution is consistent with the previous solution* (Hegde [abstract] teaches a system and method "for the optimal allocation of supply and capacity over time that satisfy two key requirements (a) being consistent with accepted operational objectives (e.g. low inventory, short lead times, prioritized allocation of supply and capacity) […]" (emphasis added) where the consistency is with the previous allocation hence consistent with the previous solution.). Hegde does not specifically teach a sequence of linear programs nor
- *aggregating, by said computing device, said demand priorities into different priority groups;*
- *allocating, by said computing device, said resources to the highest priority group of demand priorities using a first linear programming model;*
- *allocating, by said computing device, remaining resources to the next highest priority group of demand priorities using a second linear programming model, wherein said second linear programming model uses results from said first linear programming model; and*
- *repeating said process of allocating remaining resources, by said computing device, to the remaining groups of demand priorities in order of priority, and*
- *outputting, by said computing device, said production plan based on optimizing said each mathematical linear program and determining each iterative solution .*

but de Farias, in an analogous art, does and teaches use of "approximate dynamic programming" wherein problems are segregated into stages (de Farias [p.98] refers to priorities wherein priority levels serve as

stages) that are solved iteratively by linear programming problem formulations. de Farias [p.857] also refers to the "outcome of the approximate LP" which corresponds to *outputting…* and on [p.860] *inter alia* states "The first example illustrates how state-relevance weights influence the solution of the approximate LP.", and further displays an example of such solution. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Hegde and de Farias so that optimal allocations can be made among a plurality of based on priority levels.

Neither Hegde nor de Farias specifically teach that allocations are made based on demand priorities, but Fakhouri, in an analogous art, does. Fakhouri [29,23] states "In such environments, multiple independent decision support systems can co-exist in a cooperative and/or hierarchical manner." (emphasis added). Fakhouri [38,36] *inter alia* states "In brief, we obtain an integer solution by solving a linear relaxation of the ILP described above, and then heuristically converting the optimal factional solution to obtain an integer solution. Having obtained an optimal fractional solution, we convert it into an integer solution in stages, at each stage "fixing" the values of variables that have been rounded in previous stages. We tackle lower-level resource before those that depend on them. In every iteration, we identify a few resources and their associated variables. We apply the integrality constraint for those variables to obtain an ILP with a relatively small number of integrality constraints. We solve this ILP, extract the values of the selected variables from the solution, and fix those values for their respective variables for all subsequent iterations. We continue this process till we arrive at a fully integral solution." (emphasis added)). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Hegde and Fakhouri because both refer to resource allocation decisions that are prioritized in a hierarchical fashion and one of ordinary skill in the art would have had the technical capability to combine these teachings which would have had predictable outcomes.

Claim 2:

Hegde teaches the following limitations as shown.

- *said demand priorities are hierarchical and comprises two or more levels of hierarchy* (Hegde [2,60] teaches a set of hierarchical tiers and based on priority allocations (Hegde [abstract]).

Claim 5:

Hegde does not specifically teach

- *adding constraints to said mathematical linear programs at each iteration to ensure that solutions to subsequent iterations are consistent with previous solutions,* but Examiner takes **as admitted prior art** that it is old and well-known as well as common place in the mathematical sciences that mathematical programs, and in particular, dynamic programming problems are problems that are posed in a well-defined formulation wherein adding additional constraints in one stage maintains feasibility in the previous stage or within the problem definition without the additional constraint. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add additional constraints indicating the allocation of supply for that stage and wherein such additional constraint by definition maintains feasibility with the previous stage.

Claim 6:

Hegde teaches the following limitations as shown.

- *said method uses a different mathematical linear program for each iteration* (Hegde [2,10] refers to multiple stages.) Hedge does not specifically state that there is a new linear program for each iteration (stage), but Examiner takes **as admitted prior art** that it is old and well-known as well as common place in the dynamic programming sciences to use a new formulation of a linear program by adding constraints based on prior allocations and such new constraints, *ipso facto,* result in a different mathematical linear program. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Hegde, and what is old and well-known in the art as the use of optimization techniques such as linear programming sequentially applied to prioritized groups in a hierarchy would promote optimal resource allocations to such higher priority groups and one of ordinary skill in the art would have had the technical capability to combine these teachings which would have had predictable outcomes.

Claims 9 and 22:

Hegde teaches the following limitations as shown.

- *when repeating said process of allocating remaining resources, said method uses a different linear programming model for each iteration* (see the rejection of claim 6). Hedge does not specifically state that there is a new linear program for each iteration (stage), but de Farias, in an analogous art does. de Farias teaches use of approximate dynamic programming (DP) wherein each stage in the DP is approximately solved by formulating an associated linear program (LP) and using the allocation obtained to determine the resource quantities available for the succeeding stages (priority groups) which are similarly formulated as LPs but with different constraints owing to the prior allocation. Moreover, Examiner takes **as admitted prior art** that it is old and well-known as well as common place in the dynamic programming sciences to use a new formulation of a linear program by adding constraints based on prior allocations and such new constraints, *ipso facto,* result in a different mathematical linear program. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Hegde, and what is old and well-known in the art as the use of optimization techniques such as linear programming sequentially applied to prioritized groups in a hierarchy would promote optimal resource allocations to such higher priority groups and one of ordinary skill in the art would have had the technical capability to combine these teachings which would have had predictable outcomes.

26. Claims 3, 4, 7, 10–14, 16–20 and 23–27 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hegde, et al. (US 7197469 B2) in view of de Farias (*The Linear Programming Approach To Approximate Dynamic Programming: Theory And Application*) and further in view of Fakhouri, et al. (US 746147 B1) and further in view of Leachman, et al. (*IMPReSS: An Automated Production-Planning and Delivery-Quotation System at Harris Corporation-Semiconductor Sector*).

Claim 3:

Hegde does not specifically teach the following limitations as shown, but Fakhouri, in an analogous art, does.

- *backorder costs penalties are determined independently for each set of demand priorities and each successive linear programming model allocates a full range of backorder costs within a priority group to which resources are currently being allocated* (Fakhouri [29,23] states "In such environments, multiple independent decision support systems can co-exist in a cooperative and/or hierarchical manner." (emphasis added). Fakhouri [38,36] *inter alia* states "In brief, we obtain an integer solution by solving a linear relaxation of the ILP described above, and then heuristically converting the optimal factional solution to obtain an integer solution. Having obtained an optimal fractional solution, we convert it into an integer solution in stages, at each stage "fixing" the values of variables that have been rounded in previous stages. We tackle lower-level resource before those that depend on them. In every iteration, we identify a few resources and their associated variables. We apply the integrality constraint for those variables to obtain an ILP with a relatively small number of integrality constraints. We solve this ILP, extract the values of the selected variables from the solution, and fix those values for their respective variables for all subsequent iterations. We continue this process till we arrive at a fully integral solution." (emphasis added)). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Hegde and Fakhouri because both refer to resource allocation decisions that are prioritized in a hierarchical fashion and one of ordinary skill in the art would have had the technical capability to combine these teachings which would have had predictable outcomes.

Neither Hegde nor Fakhouri specifically refer to backorder penalty costs (but see Hegde [5,5] wherein back ordering costs are described), but Leachman, in an analogous art does. Leachman [p.21, col.1] states "Cash flows in the objective function include the sales revenue of each finished goods type (forecast demands case), backorder costs for supply that is delivered late (order-board demands case), inventory holding costs for excess bin output, and the incremental cost of producing additional source product." (emphasis added) where the emphasized text corresponds to *backorder costs penalties*. Although Leachman does not specifically use the term 'penalties', Examiner takes **as admitted prior art** that it is old and well-known as well as common place in the management science arts to refer to

backorder costs or other constraint violations as penalties that are included in the objective function of a mathematical program. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Hegde, Fakhouri and Leachman as the use of optimization techniques such as linear programming sequentially applied to prioritized groups in a hierarchy would promote optimal resource allocations to such higher priority groups and one of ordinary skill in the art would have had the technical capability to combine these teachings which would have had predictable outcomes.

Claim 4:

Hegde does not specifically teach the following limitations as shown, but Fakhouri, in an analogous art, does.

- *said mathematical linear programs solved in each iteration use the solution to the previous mathematical linear program as a starting solution* (Fakhouri [36,18] states "A scheme for performing the allocation of various resources based on the values for the various resources in the integer solution solution [*sic*] obtained in the previous step." See also the rejection of claim 3 above.).

Examiner takes **admitted prior art** that it is old and well-known as well as common place in the management sciences that decision/allocation problems with multiple stages are often posed as dynamic programming problems wherein each stage provides the starting point or allocation for the next stage. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Hegde, Fakhouri and Leachman and what is old and well-known in the art as the use of optimization techniques such as linear programming sequentially applied to prioritized groups in a hierarchy would promote optimal resource allocations to such higher priority groups and one of ordinary skill in the art would have had the technical capability to combine these teachings which would have had predictable outcomes.

Claim 7:

Hegde does not specifically teach the following limitations as shown, but Fakhouri, in an analogous art, does.

- *said allocating process solves said mathematical linear programs for higher demand priorities before solving for lower priorities* (Fakhouri [5,14] states "For example, if two resources depend on a resource that can only support one of them, then one way to resolve the conflict is to allocate the scarce resource to the resource with higher priority.").

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Hegde and Fakhouri and what is old and well-known in the art as the use of optimization techniques such as linear programming sequentially applied to prioritized groups in a hierarchy would promote optimal resource allocations to such higher priority groups before lower priority groups and one of ordinary skill in the art would have had the technical capability to combine these teachings which would have had predictable outcomes.

Claims 10, 16 and 23:

Hegde does not specifically teach the following limitations as shown, but Fakhouri, in an analogous art, does.

- *each different linear programming model uses a program solution of the previous linear programming model* (see the rejection of claims 3 and 4 which cite Fakhouri regarding lower-level resource allocations.).

Examiner takes **as admitted prior art** that it is old and well-known as well as common place in the management sciences that decision/allocation problems with multiple stages are often posed as dynamic programming problems wherein each stage provides the starting point or allocation for the next stage. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Hegde, Fakhouri and Leachman and what is old and well-known in the art as the use of optimization techniques such as linear programming sequentially applied to prioritized groups in a hierarchy would promote optimal resource allocations to such higher priority groups and one of ordinary skill in the art would have had the technical capability to combine these teachings which would have had predictable outcomes.

Claims 11, 17 and 24:

Hegde does not specifically teach the following limitations as shown, but Fakhouri, in an analogous art, does.

- *during said allocating processes, each linear programming model fixes variables associated with priority groups that have a lower priority than the priority group to which the resources are currently being allocated* (Fakhouri [38,40-2] teaches fixing variables according to the solutions of previous stages.). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Hegde and Fakhouri because both refer to resource allocation decisions that are prioritized in a hierarchical fashion and wherein resource allocation decisions associated with higher priority, hence established in earlier stages are fix thereby adding constraints so that subsequent formulations remain feasible for earlier ones and one of ordinary skill in the art would have had the technical capability to combine these teachings which would have had predictable outcomes.

Claims 12, 18 and 25:

Hegde teaches the following limitation as shown.

- *during said allocating processes, each linear programming model allocates the full range of backorder costs within the priority group to which the resources are currently being allocated* (Hegde [5,2-7] states "As is known, LP used in BCD is formulated as a cost minimization problem where the objective function is comprised of costs for processing, shipping, back ordering, inventory holding, and material substitution, as well as negative revenues, all of which are linear in their respective decision variables.").

Claims 13, 19 and 26:

Hegde teaches the following limitation as shown.

- *dividing said priority groups into different sub-priority tiers* (Hegde [2,36] teaches a tiered planning system and where each tier comprises a range such as "3 months to 7 yr" (Hegde [2,42]) which constitute a set of sub-priority levels. See also Hegde [16,34-38] which teaches "additional level of priority").

Claims 14, 20 and 27:

Hegde, does not specifically teach *said sub-priority tiers can be processed simultaneously,* but Fakhouri, in an analogous art, does. Fakhouri [4,55] teaches satisfying multiple constraints simultaneously, and in [26,15] states "Tasks are defined such that (a) each task is computationally significant as to the bookkeeping costs of managing parallelism" (emphasis added) where 'parallelism' indicates simultaneous processing. Furthermore, Examiner takes **as admitted prior art** that it is old and well-known as well as common place in the data processing arts to enable processes to be performed either separately or in parallel, *i.e.,* simultaneously. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to enable separate or simultaneous processing of resource allocation decisions depending on what is necessary and convenient and one of ordinary skill in the art would have had the technical capability to combine these teachings which would have had predictable outcomes.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry of a general nature or relating to the status of this application or concerning this communication or earlier communications from the Examiner should be directed to **Mark A. Fleischer** whose telephone number is **571.270.3925.** The Examiner can normally be reached on Monday-Friday, 9:30am-5:00pm. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, **Bradley Bayat** whose telephone number is **571.272.6704** may be contacted.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://portal.uspto.gov/external/portal/pair <http://pair-direct.uspto.gov >. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at **866.217.9197** (toll-free).

Any response to this action should be mailed to:

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Alexandria, VA 22313-1450

or faxed to **571-273-8300**.

Hand delivered responses should be brought to the **United States Patent and Trademark Office Customer Service Window**:

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Examiner, Art Unit 3624 2 August 2009

/Bradley B Bayat/
Supervisory Patent Examiner, Art Unit 3624